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## Author Affiliation:

<sup>1</sup>Office of the Divisional Forest Officer, Bonaigarh, Odisha, India

<sup>2</sup>Ambika Prasad Research Foundation, Odisha, India

<sup>3</sup>Institute of Biological Sciences, Odisha, India

## \*Corresponding author:

Ambika Prasad Research Foundation, Odisha, India

Email-Id: sanjeet.biotech@gmail.com

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# Identification of nesting trees and food plants of Indian Giant Squirrel in Bonai Forest Division, Odisha, India: a conservation perspective

Sanath Kumar N<sup>1</sup>, Prapti Kondaji<sup>2</sup>, Sweta Mishra<sup>2</sup>,  
Sugimani Marndi<sup>3</sup>, Sanjeet Kumar<sup>2\*</sup>

## ABSTRACT

Mining activities are important for the development of nation but it also creates problems for the flagship species as they lose their habitats. Among the floral & faunal species, Indian Giant Squirrel (IGS) (*Ratufa indica*) is much affected due to mining activities. Therefore, an attempt has been made in February-March 2022 to enumerate the nesting host trees and its food plants in mining impacted areas of Barsuan & Koira ranges, Bonai Forest Division, Odisha for restoration of its habitat. Results revealed that 10 tree species are noted having nest of IGS belonging to 8 families. It was observed that IGS consumes the plant parts of 12 species in study areas. The present study recommends to introduce the enumerated species in reserve forests of Barsuan & Koira ranges to restore the habitat of IGS for sustaining their population in mining impacted areas to balance the ecological systems of study areas.

**Keywords:** Conservation, Mining areas, Restoration, Mammals

## 1. INTRODUCTION

Mining is a major activity carried out in the state of Odisha to generate revenue mainly in the districts of Mayurbhanj, Sundargarh, Rayagada, Koraput etc. In Sundargarh, Barsuan & Koira ranges of Bonai Forest Division come under mining areas. The ranges are much affected due to excavation of minerals. For mining activities, a number of trees are cut down & continuous deforestation takes place in the Barsuan and Koira ranges of the Bonai Forest Division. Habitat loss of many faunal species is observed due to deforestation. Restoration works have been initiated in and around the mining areas by the Government & Non-Government Organizations. Despite that, there still remains a need to understand the behavior of key species of study areas for habitat restoration and making conservation strategies. Among the faunal species of these two areas, Indian Giant Squirrel (IGS) is one of the faunal species, common to both these areas facing habitat loss and a decline in

population. The IGS plays an important role to balance the forest ecological systems. They help in seed dispersal inside these forest. Keeping the importance of IGS and the negative impacts on its population due to mining & anthropological activities, an attempt has been made to enumerate the nesting trees and food plants from Barsuan & Koira ranges of Bonai Forest Division, Odisha to make the restoration plan and its conservation strategies in mining areas.

## 2. METHODOLOGY

A field survey was conducted for the enumeration of nesting trees & food plants of IGS in Barsuan and Koira ranges of Bonai Forest Division during 2021-2022. The enumerated plants were identified by the authors followed by flora's book and available literature (Haines 1921-1925; Saxena and Brahmam 1995; Acharya et al. 2019). The survey was carried out in the morning (8:00 AM-9:30 AM) and in the evening (3:30 PM - 4:30 PM) using Digital Cameras & Binoculars using line transect of 1 km x 10 m in possible sighting areas. GPS readings were also recorded to mark precise locations of the sightings.

## 3. RESULTS AND DISCUSSION

The survey revealed that about 10 species of 8 families are recorded as nesting trees in Barsuan & Koira ranges. The common nesting trees observed are *Mangifera indica* (Figure 1), *Shorea robusta*, *Terminalia elliptica*, *Diospyros malabarica* etc. Details are listed in the Table 1. It was noticed that most of the nesting trees are observed near perennial streams of both ranges. It was also observed that IGS selected trees having large climbers like *Combretum roxburghii* locally known as 'Atundi' to get easy platform for making nests. Hence, the large climbers also play an important role to provide a platform on the canopy of enumerated trees like *Shorea robusta* (Figure 2). It was noticed that IGS mostly take the leaves of *Shorea robusta* to make nest along with dried stems of many plants (Figure 3). During the survey it was noticed that the IGS consumes plant parts of selected plant species. Usually they consume more in the morning and less in the evening. It was observed that the stem pulp is consumed more followed by fruits & fruit pulp and then, leaves and seeds. The fruit pulp of *Aegle marmelos*, stem pulp of *Bombax ceiba*, *Diospyros melanoxylon* & *Pterocarpus marsupium*, fruits of *Terminalia arjuna* & *Ficus benghalensis* and tender leaf of *Vanda tessellata* were observed frequently as a food of IGS in study areas. Details are listed in the Table 2 & Plate 1. Many researchers have reported the nesting trees and food plants of IGS from different regions. Kanoje (2008) reported 30 nesting trees of IGS from Sitanadi Wildlife Sanctuary, Chhattisgarh. Baskaran et al. (2011) reported that IGS use 33 nesting trees and 25 plants for food in the tropical forests of Mudumalai Wildlife Sanctuary. Prakash et al. (2011) reported 59 nesting trees of IGS from Dalma Wildlife Sanctuary, Jharkhand. Nayak and Patra (2015) reported 44 nesting trees and 23 food plants of IGS from Kuldiha Wildlife Sanctuary, Odisha. Pradhan et al. (2017) reported 37 nesting trees & 18 food plants of IGS from Karlapat Wildlife Sanctuary, Odisha. Palei et al. (2017) reported 53 food plants of IGS from Kapilash Wildlife Sanctuary, Odisha.

**Table 1:** Nesting tree species of Indian Giant Squirrel in study areas

Plant name	Local name	Family	Location
<i>Buchanania lanzan</i>	Chara	Anacardiaceae	Barsuan range
<i>Diospyros malabarica</i>	Mankad Kendu	Ebenaceae	Barsuan range
<i>Diospyros melanoxylon</i>	Kendu	Ebenaceae	Barsuan range
<i>Mangifera indica</i>	Amba	Anacardiaceae	Barsuan range
<i>Pterocarpus marsupium</i>	Bija	Fabaceae	Barsuan range, Koira range
<i>Schleichera oleosa</i>	Kusum	Sapindaceae	Barsuan range
<i>Shorea robusta</i>	Saal	Dipterocarpaceae	Barsuan range, Koira range
<i>Syzygium cumini</i>	Jamun	Myrtaceae	Barsuan range
<i>Terminalia elliptica</i>	Asan	Combretaceae	Barsuan range
<i>Xylia xylocarpa</i>	Katha Siali	Fabaceae	Barsuan range





**Figure 1:** Nest of IGS on *Mangifera indica* at Toda Reserve Forest, Barsuan range



**Figure 2:** Role of climbers in providing base of nest on *Shorea robusta*





**Figure 3:** Role of leaves in making nest

**Table 2:** Food plants of IGS in study areas

Name	Local name	Family	Parts consumed
<i>Aegle marmelos</i>	Bel	Rutaceae	Fruit pulp
<i>Bombax ceiba</i>	Simli	Malvaceae	Stem pulp
<i>Diospyros melanoxylon</i>	Kendu	Ebenaceae	Stem pulp
<i>Ficus benghalensis</i>	Bara	Moraceae	Fruits
<i>Phanera vahlii</i>	Siali	Fabaceae	Seeds
<i>Pterocarpus marsupium</i>	Bija	Fabaceae	Stem pulp
<i>Schleichera oleosa</i>	Kusum	Sapindaceae	Stem pulp
<i>Syzygium cumini</i>	Jamun	Myrtaceae	Fruits
<i>Terminalia arjuna</i>	Arjun	Combretaceae	Fruits
<i>Terminalia bellirica</i>	Bahada	Combretaceae	Fruits
<i>Vanda tessellata</i>	Rasna	Orchidaceae	Tender leaf
<i>Xylia xylocarpa</i>	Katha siali	Fabaceae	Fruits & Stem pulp



Plate 1: Food plants of IGS in Barsuan range

#### 4. PECULIAR FINDINGS

IGS plays an important role in balancing the forest ecology. Due to anthropogenic activities and deforestation, the population of IGS is declining. Therefore, in-depth studies are needed on its nesting and feeding behavior particularly in mining impacted areas. Most of studies were done in Wildlife Sanctuary nationally but no or less studies have been done in the mining impacted areas. In mining areas, cutting down of trees and habitat loss are major threats to the IGS. Hence, present study provides an important information for restoration of IGS population in mining impacted forest areas. Some researchers reported food plant species of IGS like Pradhan et al. (2017) reported that *Cleistanthus collinus* fruits are consumed by IGS whereas we observed that IGS avoid the plant parts of *C. collinus*. The fruits of *Cleistanthus collinus* is very toxic in nature (Chrispal 2012). Therefore, *C. collinus* might not be a food plant of IGS. Some researchers also reported that barks of many plants are consumed by IGS (Ramana et al., 2019) whereas we observed stem pulp is consumed and not the bark which is consumed. However, it was also noticed that barks of some plants are consumed by IGS.

#### Recommendations

The present study recommends the following for the restoration of habitat of IGS in Barsuan & Koira ranges of the Bonai Forest Division, Odisha, India:

1. It was noticed that most of nests of IGS were observed near perennial streams of Sarkunda RF and Toda RF on *Terminalia arjuna*, *Shorea robusta*, *Schleichera oleosa*, *Diospyros malabarica* and *Mangifera indica*. Therefore, these mentioned tree species should be planted at an alarming rate in both identified ranges.
2. It was observed that in study areas, IGS often consume the stem pulp of *Pterocarpus marsupium*, *Bombax ceiba* and *Diospyros melanoxylon* & fruits of *Aegle marmelos*. Therefore, it is necessary to restore the above species in and around the nesting sites in Barsuan & Koira ranges.
3. During the survey, authors observed that local people try to hunt the IGS for food. Hence, the community awareness, protection and patrolling should be increased in order to save them from getting endangered.

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**Ethical approval**

Nesting trees and food plants of Indian Giant Squirrel in Bonai Forest Division, Odisha, India was observed in the study & gathered field approval from PCCF & HOFF, Forest and Environment Department, Gov. of Odisha. The ethical guidelines are followed in the study for the specimen collection & identification.

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**Conflicts of interests**

The authors declare that there are no conflicts of interests.

**Data and materials availability**

All data associated with this study are present in the paper.

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